Austin Critical Care Case Reports

Open Access

Austin Publishing Group

Case Report

Supporting Challenging Pediatric Intensive Care Conversations with Remote Presence Robotic Technology

Lopushinsky K[1], Holt T[2] and Hansen G[2]*

[1]Department of Pediatrics, College of Medicine, University of Saskatchewan, Canada

[2]Division of Pediatric Critical Care, Jim Pattison Children's Hospital, Canada

***Corresponding author:** Gregory Hansen, Divison of Pediatric Critical Case, Jim Pattison Children's Hopital, 103 Hospital Drive, Saskatoon, SK, S7N 0W8, Canada

Received: September 05, 2022; **Accepted:** October 06, 2022; **Published:** October 13, 2022

Abstract

In a community hospital setting, Remote Presence Robotic Technology (RPRT) has been used for pediatric intensive care consultations. Two casesare presented where RPRT was used for acute resuscitation, delivering bad news, and discussions regarding end-of-life care. Although the medical contexts of the cases differed, RPRT demonstrateda versatility and role for very sensitive and difficult conversations.

Keywords: Pediatric critical care; Telemedicine; Medical education

Introduction

Telemedicine and Remote Presence Robotic Technology (RPRT) are important to reduce physical barriers to access of care in geographically isolated, marginalized, or resource-limited settings. Its benefits for critically ill patients are well-described [1,2,3]. A study from our institution found that RPRT led to accurate triaging for critically ill children and a profound reduction of medical transports through direct assessment by a pediatric intensivist/transport physician [3].

In a Canadian community hospital, RPRT is provided by iRobot® RP-VITA (Bedford, MA, USA). The mobility of RPRT allows for a distant pediatric intensivist/transport physician intensivist (250 kilometers away) to observe a resuscitation area, which allows flexible communication with all members of the team. We report two cases in which RPRT was used in to facilitate communication with medical provider's families in very challenging situations.

Case Presentations

Case One

A previously healthy 9-year-old male presented with an acute loss of consciousness and generalized tonic-clonic seizure at home. On transport via EMS, he had decerebrate posturing, was given intravenous midazolam anda 20 mg/kg phenytoin load. In the Emergency Department, his GCS was 3 with non-reactive asymmetric pupils. His airway was instrumented via rapid sequence intubation using ketamine and rocuronium, and then an intravenous midazolam infusion was started. Computed Tomography (CT) head showed a large intraparenchymal hemorrhage in the right temporal and frontoparietal region. There was midline shift with subfalcine and uncal herniation.

Hyperosmolar therapy was started once CT findings were reported. Pediatric intensive care, which is not available on-site at the community hospital, was consulted via phone then transferred to RPRT in order to discuss management and interfacility transport. The on-call Pediatric Intensivist utilized RPRT to discuss the serious nature of the patient's condition with the family and guarded prognosis. The family decided to proceed with neurosurgical management.

An emergent right-sided craniectomy and evacuation of intraparenchymal hematoma was performed. Post-procedure, repeat CT head was performed which also showed the development of significant multifocal infarctions. The patient's condition was again discussed with the family through RPRT, and the family maintained their decision to proceed with full intensive care management. He was subsequently transported by fixed wing air ambulance to the pediatric intensive care unit hub for the province.

The patient had a prolonged course in the pediatric intensive care unit, requiring prolonged mechanical ventilatory support and tracheostomy that was later reversed. His admission was complicated by the evolution of spastic quadriplegia, ventilator-associated pneumonia, traumatic tongue lacerations and edema requiring debulking and *C. difficile* colitis. The patient was later discharged home and requires significant and constant home care.

Case Two

A 10-year-old male with a past medical history significant for autism spectrum disorder and chronic constipation visited the emergency department for severe constipation. He had feculent vomiting and was somnolent, diaphoretic, and mottled with a distended and rigid abdomen. After receiving a 10 ml/kg crystalloid fluid bolus, empiric IV antibiotics were initiated. His initial venous blood gas was notable for metabolic lactic acidosis with pH 7.15, pCO_2 54 mmHg, HCO_3^- 15 mmol/L and lactate 7.1 mmol/L. Bedside ultrasound found free fluid in the abdomen but CT abdomen did not show evidence of bowel perforation. Chemical disimpaction was recommended by pediatric surgery.

A pediatric intensivist was consulted via phone, followed by a discussion through RPRT. Interfacility transport to the provincial pediatric intensive care unit was delayed due to unavailable fixed wing transport assets. The patient's clinical trajectory worsened with generalized cyanosis, progressive feculent emesis, and hypotension. Dopamine was started via peripheral access at 5 mcg/kg/min, but a pulseless cardiac arrest shortly followed. Pediatric surgery performed an emergency decompressive laparotomy during cardiac resuscitation.

Return of spontaneous circulation was achieved after 1 hour of

Citation: Lopushinsky K, Holt T and Hansen G. Supporting Challenging Pediatric Intensive Care Conversations with Remote Presence Robotic Technology. Austin Crit Care Case Rep. 2022; 6(2): 1040.

resuscitation. A discussion was held with the family and a pediatric intensivist via RPRT regarding the prognosis of the patient given prolonged cardio-pulmonary resuscitation and severe lactic acidosis (>21 mmol/L). After this discussion, the family expressed their decision to proceed with intensive medical and surgical management. The patient was moved to the operating room for continuation of the emergency laparotomy followed by a colectomy, Hartmann's procedure with sigmoid colostomy and temporary closure. Intra-operatively, there was evidence of Disseminated Intravascular Coagulation (DIC) and worsening pulmonary edema.

Post-operatively, he was received by the pediatric intensivist via bedside RPRT and the specialized pediatric transport team (PICU registered nurse and respiratory therapist) who arrived by fixed wing transport. He required very significant inotropic and vasoactive support (1 mcg/kg/min of epinephrine and norepinephrine infusions). A subsequent RPRT family meeting was held with the pediatric intensivist, and the family elected to redirect care to comfort measures. The patient expired shortly thereafter.

Discussion

The two cases demonstrate RPRT's ability to facilitate real time discussions between pediatric intensivists, community hospital providers and particularly, families. It was used as a medium to connect with families pre-transport to discuss advance care planning, and in one case to clarify wishes for continuation of life-sustaining and life-saving measures. In the other case, RPRT facilitated re-evaluation of advance care planning that led to withdrawal of life-saving measures.

Discussing end-of-life care with families pre-transport has the potential to redefine a pediatric patient's disposition. In many instances this may be advantageous for families. Rather than unnecessary transports to the PICU environment, families can remain close to their support networks and home community. However, more work needs to be done to determine the families' perspective for these indications as its acceptance and effectiveness for this indication has not been studied.

In both cases, RPRT allowed for real time assessments of the patient's pre-transport clinical trajectory along with ongoing reassessments of goals of care. These discussions with families often happen too late in a patient's course, affecting emotions, confidence and informed decision making [4]. The involvement of pediatric intensivists via RPRT provided real time communication with the on-site pediatrician, multi-disciplinary care team and families. This may address current gaps as whereby pediatric providers often feel uncomfortable due to the weight of the decision and fear of making a mistake regarding the patient's care [5].

Despite the multiple benefits of RPRT use in clinical settings, providers still report unfamiliarity as one of the main barriers to its use [6]. With this in mind, we set to combine a simulation program with RPRT training by creating a multi-disciplinary simulation program that incorporates RPRT for pediatric intensivist support during scenarios. By combining RPRT training with a multi-disciplinary simulation program, we aim to enhance team learning and comfort with RPRT to shift its use to become the standard for pediatric intensivist consultation.

Conclusion

The use of RPRT showed tremendous versatility in communication with medical providers and parents in very difficult circumstances that also included advanced care planning, delivering bad news and end of life discussions. More work needs to be done to determine family and provider satisfaction and perceived effectiveness.

Conflicts of Interest

All authors report no conflicts of interest.

Funding Statement

No funding was used to support this project.

References

1. Holt T, Hansen G, McKinney V, Mendez I. Contemplating remote presence technology for culturally safe health care for rural indigenous children. Alter Native. 2019; 15: 31-33.
2. Subramanian S, Pamplin JC, Hravnak M, Hielsberg C, Riker R, Rincon F, et al. Tele-Critical Care: An Update From the Society of Critical Care Medicine Tele-ICU Committee. Critical Care Medicine. 2019; 48: 553-561.
3. Holt T, Sari N, Hansen G, Bradshaw M, Prodanuk M, McKinney V, et al. Remote Presence Robotic Technology Reduces Need for Pediatric Interfacility Transportation from an Isolated Northern Community. Telemedicine journal and e-health : the official journal of the American Telemedicine Association. 2018; 24: 927-933.
4. BuangSNH, Loh SW, Mok YH, Lee JH, Chan YH.Palliative and Critical Care: Their Convergence in the Pediatric Intensive Care Unit. Frontiers in Pediatrics. 2022.
5. Zhong Y, Cavolo A, Labarque V, Gastmans C. Physician decision-making process about withholding/withdrawing life-sustaining treatments in paediatric patients: a systematic review of qualitative evidence. BMC Palliative Care. 2022; 21: 23.
6. Jong M, Mendez I, Jong R. Enhancing access to care in northern rural communities via telehealth. International Journal of Circumpolar Health. 2019; 78: 1554174.